

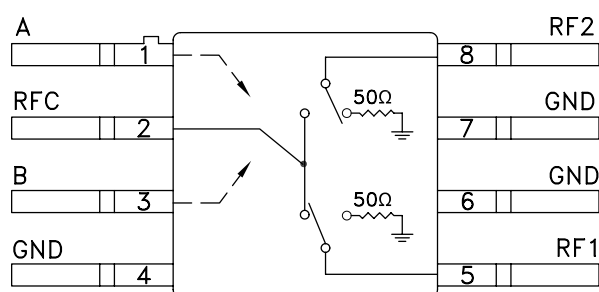
GaAs MMIC HIGH ISOLATION SMT SPDT SWITCH, DC - 6.0 GHz

Typical Applications

The HMC233G8 is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military Radios, Radar & ECM
- Space Systems
- Test Instrumentation

Functional Diagram



Features

Isolation: 44 dB @ 2.0 GHz
31 dB @ 6.0 GHz

Insertion Loss: 1.5 dB Typical @ 4.0 GHz

Non-Reflective Design

Hermetic Surface Mount Package

General Description

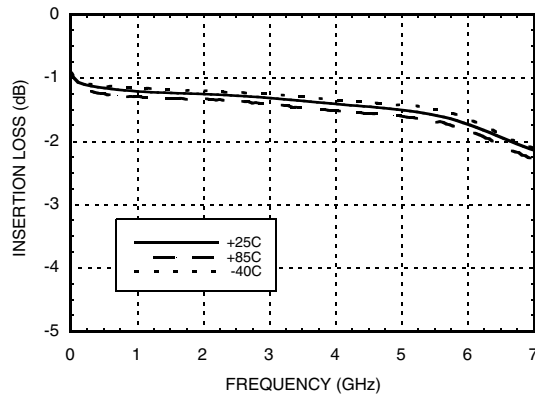
The HMC233G8 is a broadband high isolation non-reflective GaAs MESFET SPDT switch in a hermetic surface mount package. Covering DC to 6.0 GHz, the switch features >44 dB isolation up to 2 GHz and >31 dB isolation up to 6.0 GHz. The switch operates using complementary negative control voltage logic lines of -5/0V and requires no bias supply.

Electrical Specifications, $T_A = +25^\circ\text{C}$, With 0/-5V Control, 50 Ohm System

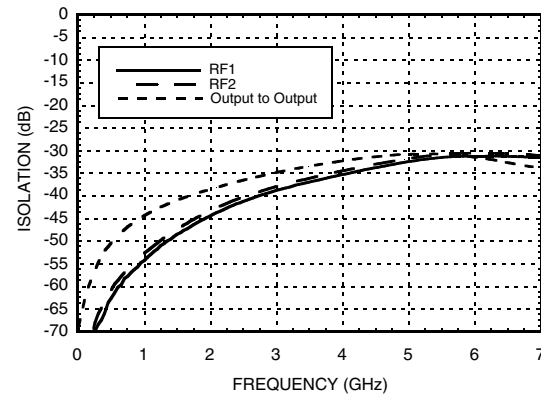
| Parameter | Frequency | Min. | Typ. | Max. | Units |
|--|---------------|------|------|------|-------|
| Insertion Loss | DC - 2.0 GHz | | 1.3 | 1.6 | dB |
| | DC - 4.0 GHz | | 1.5 | 1.8 | dB |
| | DC - 6.0 GHz | | 1.8 | 2.2 | dB |
| Isolation | DC - 2.0 GHz | 39 | 44 | | dB |
| | DC - 4.0 GHz | 30 | 35 | | dB |
| | DC - 6.0 GHz | 26 | 31 | | dB |
| Return Loss | DC - 5.0 GHz | | 17 | | dB |
| | DC - 6.0 GHz | | 14 | | dB |
| Return Loss RF1, RF2 | DC - 4.0 GHz | | 12 | | dB |
| | DC - 6.0 GHz | | 8 | | dB |
| Input Power for 1 dB Compression | 0.5 - 6.0 GHz | 22 | 27 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone, 1 MHz Tone Separation) | 0.5 - 6.0 GHz | | 46 | | dBm |
| Switching Characteristics | DC - 6.0 GHz | | 3 | | ns |
| | | | 6 | | ns |

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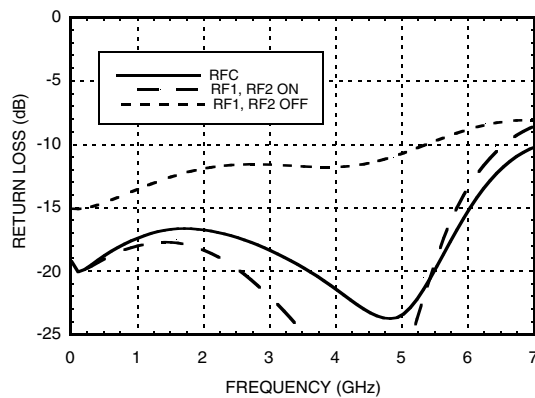
Insertion Loss



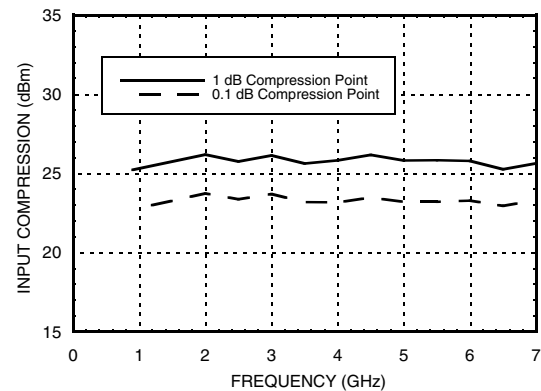
Isolation



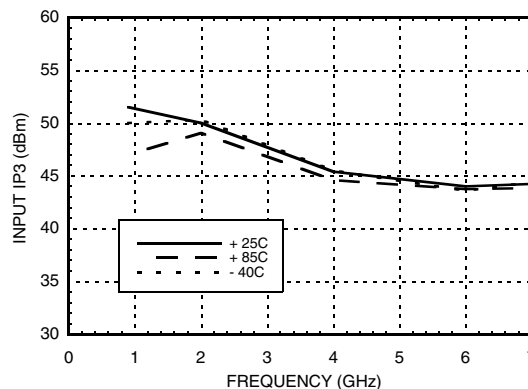
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Absolute Maximum Ratings

| | |
|--|--------------------|
| RF Input Power ($V_{ctl} = -5V$) (0.5 - 6 GHz) | +30 dBm (@ +85 °C) |
| Control Voltage Range (A & B) | +1.0V to -7.5 Vdc |
| Hot Switch Power Level | +27 dBm |
| Channel Temperature | 150 °C |
| Continuous P_{diss} ($T = 85$ °C) (derate 4 mW/°C above 85 °C) | 0.25 W |
| Thermal Resistance (Insertion Loss Path) | 148 °C/W |
| Thermal Resistance (Terminated Path) | 260 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |

Control Voltages

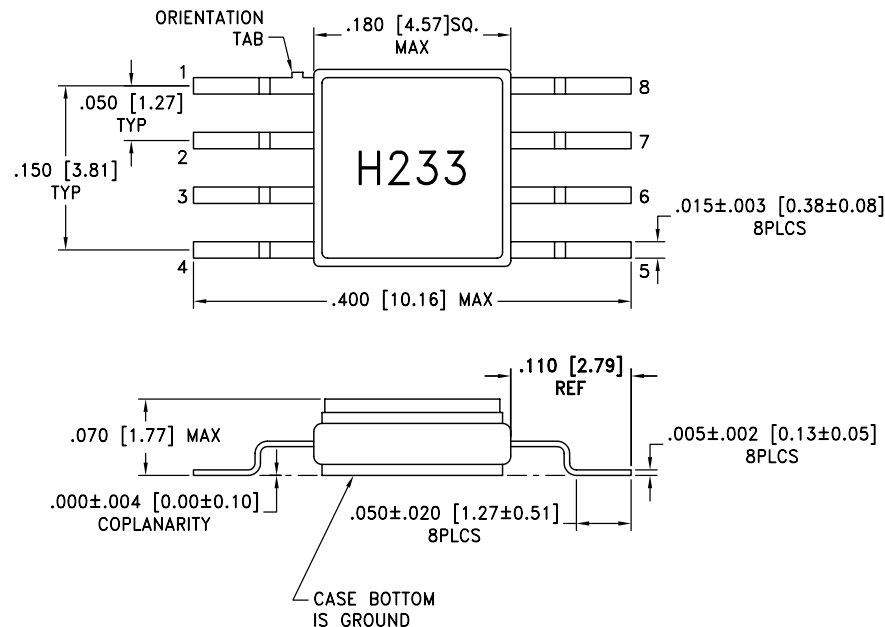
| State | Bias Condition |
|-------|--------------------------------------|
| Low | 0 to -0.2V @ 10 uA Max. |
| High | -5V @ 10 uA Typ. to -7V @ 45 uA Typ. |

Truth Table

| Control Input | | Signal Path State | |
|---------------|------|-------------------|------------|
| A | B | RFC to RF1 | RFC to RF2 |
| High | Low | ON | OFF |
| Low | High | OFF | ON |

Caution: Do not "Hot Switch" power levels greater than +27 dBm ($V_{ctl} = 0/-5$ Vdc).

Outline Drawing

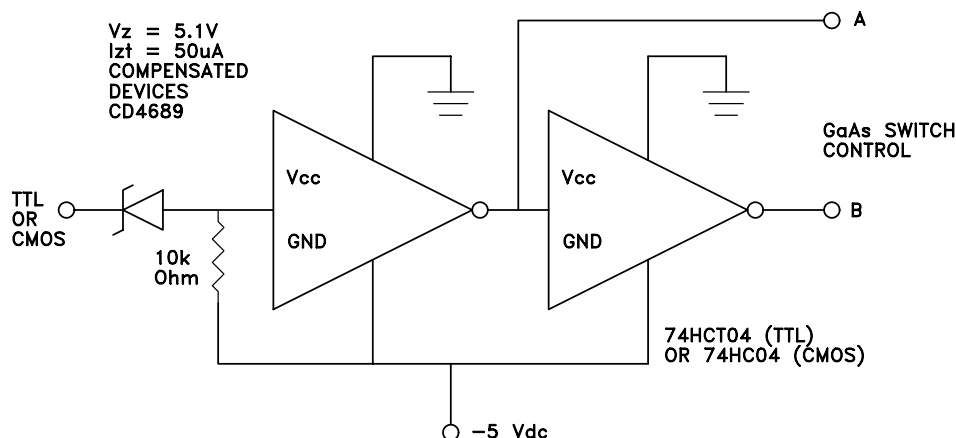


NOTES:

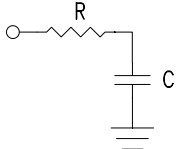

1. PACKAGE MATERIAL: ALUMINA LOADED BOROSILICATE GLASS.
2. LEADS, BASE, COVER MATERIAL: KOVAR™ (#7052 CORNING).
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 50 MICROINCHES MIN.
4. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: .±005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

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Suggested Driver Circuit

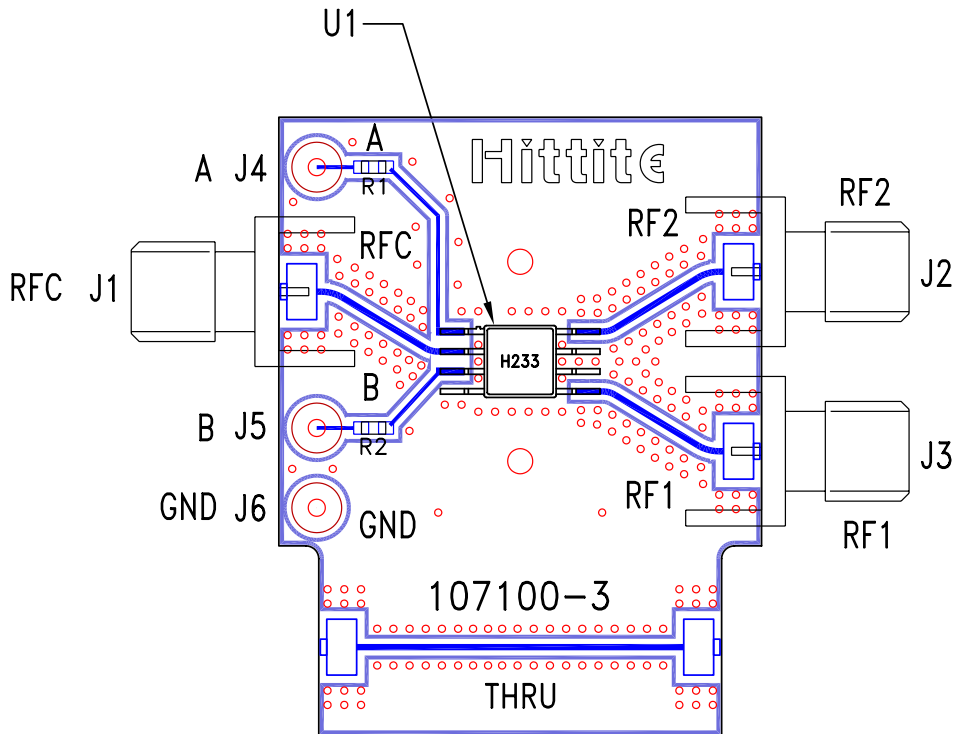


Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|---------------|--|---|
| 1, 3 | A, B | See truth table and control voltage table. |  |
| 2, 5, 8 | RFC, RF1, RF2 | These pins are DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V. | |
| 4, 6, 7 | GND | Package bottom must also be connected to PCB RF ground. |  |

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Evaluation PCB



List of Materials for Evaluation PCB 107183*

| Item | Description |
|--|-----------------------------|
| J1 - J3 | PC Mount SMA RF Connector |
| J4 - J6 | DC Pin |
| R1, R2 | 100 Ohm Resistor, 0603 Pkg. |
| U1 | HMC233G8 SPDT Switch |
| PCB** | 107100 Evaluation PCB |
| ** Circuit Board Material: Rogers 4350 | |

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and package bottom should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.

* Reference this number when ordering complete evaluation PCB.

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Notes: